

Prof. Ernst, who attributes the "rain" to secretion from glands on the footstalk of the leaf on which drops of liquid are found, which are rapidly renewed on being removed with blotting paper. It is curious that precisely the same question has been the subject of controversy in the Old World with respect to honey-dew. It is generally believed that this is the result of the aggregate ejecta of Aphides feeding on the juices of the lime. So competent an observer, however, as Boussingault was of opinion that honey-dew was a spontaneous exudation, and it seems not impossible that the lime, as well as the *Pithecolobium Saman* may, under some abnormal circumstances, exude a sugary secretion which insects would eagerly feed on.¹

W. T. THISELTON DYER

NOTES

WE have to record still another great loss to science in the death on Tuesday, at Rome, of Father Secchi, the eminent astronomer, whose serious illness we recently recorded. We can do no more at present but announce the sad event.

ABOUT 355£ have been subscribed to the Darwin Memorial Fund, the idea of which, our readers may remember, originated at Cambridge on the occasion of conferring the degree of LL.D. on Mr. Darwin. We would again draw the attention of our readers to the fund; many of them, we are sure, will be glad to contribute to it, and those who desire to do so should lose no time in sending their subscriptions to the treasurer and secretary, Mr. A. G. Dew-Smith, Trinity College, Cambridge.

A COMMITTEE of members of the several classes of the French Institute, together with a number of eminent scientific men, has been formed to promote the erection of a monument to Leverrier in the grounds of the Paris Observatory. It is expected that foreigners as well as Frenchmen will subscribe.

PROF. FLOWER'S Hunterian Lectures at the Royal College of Surgeons this year will treat of the Comparative Anatomy of Man, more particularly of the Osteological and other Physical Peculiarities of the Races of Australia and the Pacific Ocean. The first two lectures will be devoted to an exposition of the principal methods of craniological research, exemplified by a series of fifty Australian and as many European skulls. The account of the structure of each race will be preceded by a notice of the principal facts of its history and social condition. The lectures commence on Monday next at 4 o'clock, and will be continued at the same hour on Mondays, Wednesdays, and Fridays, till March 28. Any one interested in the subject is admitted.

THE Philosophic Faculty of the University of Zurich has just conferred the degree of Doctor Philos. *honoris causa* on Mr. J. J. Wild, formerly of the scientific staff of H.M.S. *Challenger*, and author of the recent work, "Thalassa," embodying some of the results of that expedition.

THE Photographic Society have awarded to Capt. Abney a silver Progress Medal for having made the greatest advance in the science of photography during the past year.

THE third general meeting of Polish naturalists and physicians will take place at Cracow this year. The two former meetings were held at Posen and Lemberg respectively.

THE Committee of the French Association for the Advancement of Science held a meeting last Thursday. The 16th of August was appointed for the opening of the session, which will be presided over by M. Fremy. The general and sectional meetings will take place at the Hôtel des Beaux Arts, Paris, which contains an immense number of rooms tastefully decorated with fine pictures. The Committee has distributed 8,850 francs among a number of inventors who are constructing machines or scientific

apparatus for exhibition. A number of other *encouragements* for similar purposes will be distributed; among the scientific men who will be assisted we are in a position to mention the name of M. Mouchot, for establishing on a large scale his celebrated solar steam-engine.

THE annual session of the Deutsche anthropologische Gesellschaft for 1878 begins at Hamburg on August 11. The meetings on the 12th, 13th and 14th take place at Kiel, and those on the 15th and 16th at Lübeck.

In the January session of the Berlin anthropologische Gesellschaft, Prof. G. Fritsch delivered an exhaustive address on the subject of Bushman drawings, in which he compared his own observations in the Cape Colony with the late discoveries of Rev. C. G. Büttner in the neighbourhood of Ameib, in the Damara region. These combined results show the widely extended presence of these drawings in South Africa and the existence of a surprising familiarity with perspective and the principles of grouping. In view of the fact that the Bushmen are probably the most degraded race of mankind now existing, dwelling as they do in caves and living from hand to mouth, these evidences of the first principles of art among them possess no small degree of value as explanatory of numerous attempts at illustration before the stone and bronze ages. This is especially the case with the cave dwellers of the so-called reindeer epoch, whose remains have been uncovered recently in France and Switzerland. Anthropologists have had frequent discussions during the past year with regard to the origin of the sketches of animals in the cave of Thainingen, supposed to date back to this epoch; and the opinion has been stoutly maintained that the human race at this stage of development was utterly unable to produce works of this kind. This view will scarcely be tenable in light of these late discoveries among the Bushmen, who are certainly not advanced beyond the stone-age.

It is expected that the British Archæological Association will hold its annual congress next summer at Wisbeach, to which it has been courteously invited by the Mayor and Corporation. If this arrangement should be definitely made the Prince of Wales will be asked to allow his name to be used as the patron of the congress.

THE Russian division in the Paris Exposition will contain a most interesting anthropological collection, the material for which is now being gathered by a Commission in Moscow. Among the more prominent features are an enormous cranial collection from the various parts of the empire, and a model of a Russian barrow. The latter is being executed by the sculptor, Ssewojugin, in natural size, and will offer a perfect imitation of the skeletons, ornaments, weapons, &c., as usually found in these ancient remains. The Russian educational system will be likewise very fully represented, as was the case in 1876.

THE official report of the Munich Session of the German Scientific Association, which took place last September, has just appeared. It forms a volume of 264 quarto pages, and has been prepared with unusual care. Reports of all addresses delivered have been furnished by the speakers themselves, who numbered considerably over a hundred. The number of members and participants in the last session was 1,800, of whom 650 were from Munich or its vicinity. We notice that the Society is exceedingly strict in the observance of one of its statutes stating that it shall possess no property with the exception of its archives, for the receipts exactly cover the expenses.

THE death is announced of Major-General Sir Andrew Scott Waugh, F.R.S., of the Royal Engineers, at the age of sixty-eight. He entered the Bengal Engineers in 1827, and assisted in the making of the great Trigonometrical Survey of India in 1832. He also took a leading part under Sir George Everest

¹ I have translated Boussingault's paper, and collected the evidence on both sides, in the *Journal* of the Royal Horticultural Society, new series, vol. iv. pp. 1-7.

in the measurement of the great Indian arc for determining the figure and dimensions of the earth. In 1843 he was appointed Surveyor-General of India and Superintendent of the Trigonometrical Survey. He received the honour of knighthood in 1860, and the Gold Medal of the Royal Geographical Society in 1857-58.

MM. HENRY brothers, the celebrated astronomers, have invented a telegraphic warning apparatus, which can be used for telephones. It is powerful, cheap, and simple, and musical sounds emitted can be heard at a distance without placing the ear at the opening of the mouth-piece.

THE *Gardener's Chronicle* announces that M. Thuret's fine garden at Antibes has fortunately become the property of the French nation, and will be constituted a Mediterranean branch, as it were, of the Jardin des Plantes at Paris. The direction will be in the hands of M. Naudin, now of Collioure, who in this new field of action will have greater scope than before for his experiments in naturalisation. The object is to maintain the garden as a botanic and experimental garden, where all new introductions may be tried and distributed to other gardens.

It is stated that the German poet, Friedrich Bodenstedt, the author of the charming "Lieder des Mirza Schaffy," is now engaged in translating the poems of the Persian philosopher Omer Cheijan. The latter was born at Nishaboor, in the twelfth century, and was one of the greatest astronomers and philosophers of his time. He recorded the results of his studies in verse.

At a village near the well-known German watering place, Langenschwalbach (in the Prussian province of Nassau) some interesting experiments have been recently made with the common nettle (*Urtica dioica*). They consisted in working this weed in the same manner as hemp; the fibres obtained were fine as silk, while they yielded nothing to hemp fibres as regards durability. A considerable area has now been planted with nettles at the locality named.

SOME highly interesting antiquities were recently found near Wisby, on the Swedish island of Gotland, in the Baltic. Excavations are being made for a new railway, and in a gravel pit, about a foot under the surface, a copper casket was found, which contained two sets of bronze weights, each set consisting of five different pieces, and belonging to an old Arabic monetary system. Besides these weights there was a peculiar magnifying glass in the box, while on the top of all there were found two balance scales, a larger and a smaller balance beam, the former with chains, the latter with flaxen strings, which were still preserved. All the objects were artistically finished and made of bronze.

PROF. LEIDY has been engaged, in connection with Dr. Hayden's expedition during the past season, in exploring the region about Fort Bridger, Uintah Mountains, and the Salt Lake Basin, with special reference to the occurrence there of rhizopods. These have been for several years the special object of Prof. Leidy's attention, and his extensive manuscripts, with many coloured drawings, will probably be published before long.

MR. W. H. HOLMES, the artist of Dr. Hayden's party, has been prosecuting explorations among the Pueblo villages, both ancient and modern, in Northern New Mexico and Arizona, and has collected data for making models in plaster of the pueblos of Taos and Acorna, which will probably be added to the superb series of these archæological restorations deposited by Prof. Hayden in the National Museum.

WE understand that the National Entomological Exhibition, which will be opened at the Royal Aquarium, Westminster, on March 9 is likely to be a great success. Already several thousand square feet of space have been applied for.

It is surprising to hear that M. Ruhmkorf's workshop has been sold by auction at the ridiculous price of 42*l*.

A NOVEL use of the telegraph has lately been adopted by the Norwegian Government. As is well known, the herring fishery forms one of the most important sources of income for the country, the captures being made as the great shoals come from the depths of the sea to deposit their spawn in the Norwegian fiords. It frequently happens that the object of their visit is accomplished, and they return to the ocean before news of their arrival reaches the fishers on distant parts of the coast. This difficulty is now obviated by the construction of a telegraphic line, 200 kilometres in length, composed chiefly of submarine cables, by means of which the fishers along the whole coast are enabled to gather at once on the approach of a shoal to any particular fiord. The abundant captures made in this way show the investment in telegraphic wire to have been a most profitable speculation.

BARON VON BIBRA states in the *Journal für praktische Chemie*, that he has been enabled to restore the handwriting in old manuscripts, by washing them with a solution of tannin, and drying at 75° C. He has likewise found that nitro-benzene can be used for the restoration of antique paintings, whether painted on wood or canvas.

A STRANGE little work has just been published at Weimar (Weissbach); its title is "Das Buch der Katzen," its author Herr Gustav Michel. In six letters the author gives an interesting account of the somewhat rich material, treating the same in turn from a scientific, historic, domestic, religious, and mythological point of view.

IN a communication to the American Philosophical Society on the 1st inst., by Mr. A. Wilcocks, of Louisiana, the author describes an interesting observation which he made of a shadow cast by Venus, against a white wall, in a piazza. "The shadow of a hand," he states, "distant twelve feet from the wall, I found perfectly sharp and well defined. And more striking still, the shadow of the twigs of a pecan tree, distant fifty yards, were also sharp. These last shadows were faint, from the effect of the diffused light of the sky which illumined the wall."

WE take the following interesting statistical data from the *Jahresbericht* for 1877 on the establishments of the world-known firm of Krupp at Essen, Rhenish Prussia. The number of workmen in the cast-steel works amounts to 8,500. There are 298 steam-engines with separate boilers in the establishment, and the total of their horse-power amounts to 11,000. Besides these there are 77 steam hammers at work varying in weight from 2 cwt. to 50 tons. The products in every 24 hours amount to about 12 English miles of rails with tyres, axles, wheels, springs in proportion, as well as 1,500 shells of various sizes and constructions. In one month 300 guns (of various bores) are produced. Since 1847 no less than 15,000 cannon have been made. The daily consumption of coal and coke is 1,800 tons. There are 21,000 gas flames on the works. A railway of 60 kilometres length, with [24 locomotive engines, and 700 carriages exclusively belongs to the establishment; there are also 44 different telegraph stations, and a fire brigade with 8 engines. A new shooting ground of 18 kilometres length is now being adapted near Meppen (Hanover). In the coal and other mines belonging to the firm there are 5,300 workmen. Their mines in northern Spain produce 200,000 tons of iron ore annually; 5 steamers belonging to the firm convey these ores to their destination. The metallurgical establishment contains 700 workmen. In 3,277 workmen's dwelling-houses built by the firm there live 16,200 men, women, and children. They are supplied with provisions, &c., at 22 stores at wholesale prices. The bakehouse produces about 195 tons of bread per day. Last, but not least, there are 4 general schools with 21 classes, and an industrial school for girls and women on the establishment,

LORD JOHN MANNERS stated in the House of Commons on Thursday last that experiments have been made by officers of the Post-Office with the telephone, the result being that the instrument is not at present considered suitable for public telegraphy.

IN Prof. Lebour's letter on Marine Fossils in the Gannister Beds of Northumberland, in last week's NATURE, the word *country* should have been *county*. It is the first time marine forms have been found in this series in Northumberland.

THE additions to the Zoological Society's Gardens during the past week include two Black-winged Pea-Fowls (*Pavo nigripennis*) from Cochín China, presented by the Hon. A. S. G. Canning, F.Z.S.; a Javan Parrakeet (*Palaornis javanica*) from Muttra, North-West India, presented by Mr. Barthorp; two Red-vented Bulbuls (*Pycnonotus hamorrhous*) from India, presented by Col. A. L. Annerley, F.Z.S.; two Leopards (*Felis pardus*) from Persia, deposited; two Barbary Wild Sheep (*Ovis tragelaphus*) from North Africa; two Pale-headed Parrakeets (*Platycercus pallidiceps*) from North-East Australia; four Turquoise Parrakeets (*Euphema pulchella*) from New South Wales, purchased; two Tigers (*Felis tigris*), born in the Gardens.

ON COMPASS ADJUSTMENT IN IRON SHIPS¹

II.

AN important objection was made to me some years ago by Capt. Evans against the use of quadrantal correctors in the Navy, that they would prevent the taking of bearings by the prismatic azimuth arrangement, which forms part of the Admiralty standard compass. The azimuth mirror (Fig. 5) applied to the compass before you was designed to obviate that objection. Its use even for taking bearings of objects on the horizon is not interfered with by the globes constituting the quadrantal correctors, even if their highest points rise as high as five inches above the glass of the compass-bowl. It is founded on the principle of the camera lucida. The observer when taking a bearing turns the instrument round its vertical axis until the mirror and lens are fairly opposite to the object. He then looks through the lens at the degree divisions of the compass-card, and turns the mirror round its horizontal axis till he brings the image of the object to fall on the card. He then reads directly on the card the compass bearing of the object. Besides fulfilling the purpose for which it was originally designed, to allow bearings to be taken without impediment from the quadrantal correctors, the azimuth mirror has a great advantage in not requiring any adjustment of the instrument, such as that by which, in the prism compass the hair is brought to exactly cover the object. The focal length of the lens in the azimuth mirror is about 12 per cent. longer than the radius of the circle of the compass-card, and thus, by an elementary optical principle, it follows that two objects a degree asunder on the horizon will, by their images seen in the azimuth mirror, cover a space of $1^{\circ} \cdot 12$ of the divided circle of the compass-card seen through the lens. Hence, turning the azimuth instrument round its vertical axis through one degree will only alter the apparent bearing of an object on the horizon by $\cdot 12^{\circ}$. Thus it is not necessary to adjust it exactly to the direct position for the bearing of any particular object. If it be designedly put even as much as 4° awry on either side of the direct position, the error on the bearing would hardly amount to half a degree. If the instrument were to be used solely for taking bearings of objects on the horizon, the focal length of the lens should be made exactly equal to the radius of the circle, and thus even the small error of $\cdot 12^{\circ}$ in the bearing for one degree of error in the setting would be avoided. But one of the most important uses of the azimuth instrument at sea is to correct the compass by bearings of sun or stars at altitudes of from 0° to 50° or 60° above the horizon. The actual focal length is chosen to suit an altitude of 27° , or thereabouts (this being the angle whose natural secant is $1 \cdot 12$). Thus if two objects whose altitudes are

27° , or thereabouts, and difference of azimuths 1° , are taken simultaneously in the azimuth mirror, their difference of bearings will be shown as one degree by the divided circle of the compass-card seen through the lens. Hence for taking the azimuth of star or sun at an altitude of 27° , or thereabouts, no setting of the azimuth mirror by turning round the vertical axis is necessary, except just to bring the object into the field of view, when its bearing will immediately be seen accurately shown on the divided circle of the compass-card. This is a very valuable quality for use in rough weather at sea, or when there are flying clouds which just allow a glimpse of the object, whether sun or star, to be caught, without allowing time to perform an adjustment, such as that of bringing the hair, or rather the estimated middle of the space traversed by the hair in the rolling of the ship, to coincide with the object. The same degree of error as on the horizon, but in the opposite direction, is produced by imperfect setting round the vertical axis in taking the bearing of an object at an elevation of 38° .

Thus for objects from the horizon up to 38° of altitude the error in the bearing is less than 12 per cent. of the error of the setting. For objects at a higher elevation than 38° the error rapidly increases; but even at 60° altitude the error on the bearing is a little less than half the error of the setting; and it is always easy, if desired, to make the error of the setting less than

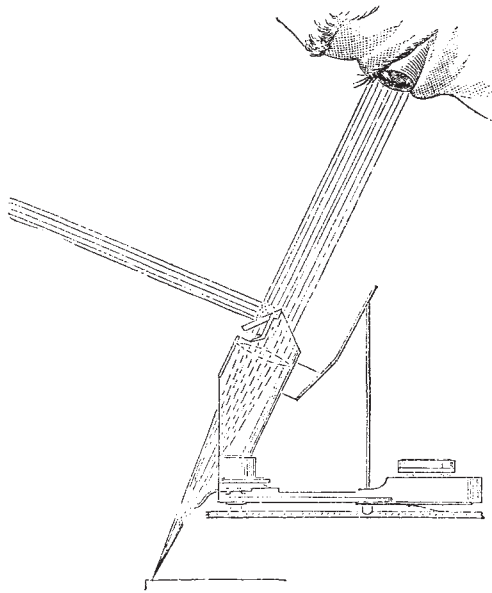


FIG. 5.

a degree by turning the instrument so that the red point, which you see below the lens, shall point within a degree of the position marked on the circle of the compass-card by the image of the object.

For taking star azimuths the azimuth mirror has the great advantage over the prism compass, with its then invisible hair, that the image of the object is thrown directly on the illuminated scale of the compass-card. The degree of illumination may be made less or more, according to faintness or brilliance of the object, by holding a binnacle lamp in the hand at a greater or less distance, and letting its light shine on the portion of the compass-card circle seen through the lens. Indeed, with the azimuth mirror it is easier to take the bearing of a moderately bright star by night than of the sun by day: the star is seen as a fine point on the degree division, or between two, and it is easy to read of its position instantly by estimation to the tenth of a degree. The easiest, as well as the most accurate of all, however, is the sun when bright enough and high enough above the horizon to give a good shadow on the compass-card. For this purpose is the stout silk thread which you see, attached to the framework of the azimuth mirror in such a position that when the instrument is properly placed on the glass of the compass-bowl, the thread is perpendicular to the glass and through the central bearing-point of the compass.

Another advantage of the azimuth mirror particularly important for taking bearings at sea when there is much motion, is

¹ Report of paper read to the Royal United Service Institution, February 4, by Sir Wm. Thomson, LL.D., F.R.S., P.R.S.E., Professor of Natural Philosophy in the University of Glasgow, and Fellow of St. Peter's College, Cambridge. Revised by the Author. [The Council of the R.U.S.I. have kindly permitted us to publish Sir W. Thomson's paper in advance, and have granted us the use of the illustrations.—Ed.] Continued from p. 334.